

**Conventional Light Frame
Construction Design Provisions 2007 CBC**

Handout No. 2-21

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This document summarizes the requirements for using Conventional Light Frame Construction based on the 2007 California Building Code for single story, single family remodels and additions in the City of San Jose.

Bearing Wall Height: Not to exceed 10 feet plus a floor height not to exceed 16 inches.

Cripple Walls: Shall be considered another story unless less than 14 inch in height and solid blocked.(A fully sheathed cripple wall will be allowed up to 4 feet high?).

Average Dead Loads: Shall not exceed 15 psf for combined roof and ceiling, exterior walls, floors and partitions. This allows a tile roof up to 6 pounds per square foot only.

Live Loads: Shall not exceed 40 psf for floors.

Rafters or Roof Trusses: Shall not span more than 40 feet.

Irregular Structures: Portions of buildings considered irregular must be designed and conventional construction provisions cannot be used.

- a. A **portion** of a building is defined as containing volume and area.
- b. Where a section of roof is not supported on all edges it is considered irregular, however, it is permitted if the length of walls supporting the roof do not exceed more than 6 feet from a braced wall line.
- c. Braced walls that are not perpendicular are considered irregular.

Braced Wall Lines: Buildings shall be provided with braced wall lines in each direction not exceeding 25 feet spacing.

- a. All braced wall panel top and bottom plates shall be fastened to joists, rafters or full depth blocking and shall be extended and fastened to roof framing.
- b. Where roof trusses are used, lateral forces shall be transferred from the roof diaphragm to the top plate by blocking. Such blocks shall be fastened with a minimum of three 8d nails.
- c. Joists parallel to the top plates shall be nailed to the top plates with not less than three 8d nails per 16 inches.
- d. Top plate splices, for the full length of the braced wall line, shall be nailed with at least eight 16d nails on each side of each break in the plate.
- e. Bottom plate fastening to joist or blocking below shall be with not less than three 16d nails per 16 inches.

Braced Wall Line Support: All braced wall lines need continuous foundations unless the building is less than 50 foot wide in both directions.

Braced Wall Line Sheathing: Braced wall lines shall be braced by one of the types of sheathing listed in Table 2308.9.3 (attached) and the list below. The sum of the lengths of braced wall panels at each braced wall line shall be at least 12 feet of braced wall panels for every 25 feet of braced wall line in Postal Zip Codes 95008, 95117, 95118, 95120, 95123, 95124, 95125, 95129, 95130, and 95126. All other Zip Codes within the City of San Jose shall have at least 8ft 4 inches of braced wall panel for each 25 feet of Braced wall line. Braced wall panels shall be at least 48 inches in length, covering three stud spaces where studs are spaced 16 inches (406mm) on center and covering two stud spaces where studs are spaced 24 inches (610 mm) on center. Panels shall be distributed along the braced wall line and individual panels can be offset no more than 4 feet along any braced wall line. Panels shall start within 8 feet from the end of the wall line and shall be clearly indicated on the plans. Note that San Jose does not permit Gypsum board (Sheetrock) or let-in diagonal bracing to be used for conventional bracing.

The following braced wall panel construction is allowed:

Wood boards of 5/8-inch (16 mm) net minimum thickness applied diagonally on studs spaced not over 24 inches (610 mm) on center.

Wood structural panel sheathing with a thickness not less than 5/16 inch (7.9mm) for 16-inch (406 mm) stud spacing and not less than 3/8 inch (9.5 mm) for 24-inch (610 mm) stud spacing in accordance with Tables 2308.9.3(2) and 2308.9.3(3).

Fiberboard sheathing 4-foot by 8-foot panels not less than 1/2 inch thick applied vertically on studs spaced not over 16 inches on center when installed in accordance with Table 2306.4.4.

Particleboard wall sheathing panels where installed in accordance with Table 2308.9.3(5).

Portland cement plaster on studs spaced 16 inches (406 mm) on center and installed in accordance with Section 2510. The maximum height-to-width ratio of these braced wall panels shall be 2:1 and the lath shall be nailed at the top and bottom plates at 6 inches on center and at any other edges or joints..

Hardboard panel siding when installed in accordance with Table 2308.9.3(5) and identified by an approved agency as conforming to AHA A135.6 .

Alternate Braced Wall Panels: Any required braced wall panel may be replaced by an alternate braced wall panel constructed in accordance with the following:

1. Panels shall have a length not less than 2 feet 8 inches (813 mm) and a height of not more than 10 feet (3048 mm).
2. Each panel shall be sheathed on one face with 3/8-inch-minimum-thickness (9.5 mm) wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with Table 2304.9.1 and blocked at all edges.
3. Two anchor bolts shall be provided in each panel. Anchor bolts shall be placed at panel quarter points. Each panel end stud shall have an approved tie-down device fastened to the foundation, capable of providing an uplift capacity of not less than 1,800 pounds (816.5 kg). The tie-down device shall be installed in accordance with the manufacturer's recommendations.
4. The panels shall be supported directly on a foundation or on floor framing supported directly on a foundation which is continuous across the entire length of the braced wall line. This foundation shall be reinforced with not less than one No. 4 bar top and bottom.
5. Where the continuous foundation is required to be more than 12 inches deep, a 12" by 12" footing with a #4 rebar at the top and at the bottom may be used across door openings.

Manufactured Shear Panels Manufactured engineered shear wall panels (Currently only Simpson panels are approved) may be used to substitute for the required braced wall panels required along any braced wall line when approved for this use by ICC. Engineered panels must be installed per their manufacturer's installation instructions and each engineered panel is equivalent to 5 feet of required braced wall length.

Alternate Braced Wall Panels Next to Doors or Windows: Any required braced wall panel may be replaced by a special alternate braced wall panel when it is immediately adjacent to a door or window opening with a full length header that spans the alternate braced panel and the window or door opening. This special alternate panel shall meet the following requirements:

1. Each panel will have a length of at least 16 inches and a height of no more than 10 feet.
2. Each panel shall be sheathed with minimum 3/8 inch thick wood structural panel, nailed at 3 inches on center into all framing. The plywood shall extend, unbroken, up to the top of the header. Other nailing details are shown in Figure 2308.9.3.2.
3. The header shall extend from the first full height stud of the panel to the other side of the opening, but must be at least 6 feet and no more than 18 feet across the opening.
4. A strap with at least 1000# capacity must attach the last trimmer stud of the panel to the header. This strap must be on the opposite side of the header from the sheathing.

5. At the far end of the opening another 1000# strap shall attach the header to the trimmer studs.
6. A single anchor bolt and two hold-downs with a minimum uplift capacity of 4200 pounds are required to anchor the panel directly to the foundation. All hold-down devices must be the embedded strap type, installed per the manufacturers installation requirements.
7. The studs at the far end of the header shall have a hold-down device with at least 1000# uplift capability.
8. When the footing depth is required to be more than 12 inches, a 12" by 12" footing with a #4 rebar at the top and bottom can be used at door openings in the braced wall line.

Foundation Sill Plates: Foundations shall be per Chapter 18 and sill plates shall be minimum 1 1/2 inches thick and at least as wide as the studs. Anchor bolts need to be minimum 5/8 inch diameter with 7 inches embedment spaced not more than 6 feet apart. Washers must be 3" x 3" x 0.229" thick steel and can be slotted for centering if a regular cut washer is used as well.

Girders Minimum girder size is nominal 4x6 inches and maximum span is 6 feet between supports. The maximum spacing is 8 feet. Joints must be strapped and occur over a support. Minimum end bearing on concrete is 3".

Floor Joists: Spans for floor joists will be per the tables in CBC Section 2308.8. Bearing shall be at least 1 1/2 inches on wood or metal and 3 inches on masonry. Joists shall be supported laterally at ends and at all bearing points by blocking or by a header, band or rim joist at the end. Solid blocking shall be at least 1 1/2 inch thick and the full depth of the joist. Joists framing from opposite sides of a beam or girder must lap at least 3 inches or be adequately strapped.

Trimmer and header joists shall be doubled around floor openings when the header is longer than 4 feet. Header joists longer than 6 feet and tail joists longer than 12 feet shall use approved framing anchors.

Bearing partitions parallel to the joists shall be supported on beams, girders or double joists. Bearing partitions perpendicular to the joists shall not be offset from supporting girders or walls more than the joist depth.

Lateral Support of Joists: Floor, attic or roof framing with a nominal depth-to-thickness ratio greater than or equal to 5:1 shall have one edge held in line for the entire span. Where the nominal depth-to-thickness ratio exceeds 6:1 there shall be one line of full depth bridging or approved cross bracing for each 8 feet of span unless both edges are held in line for the entire span.

Wall Framing: The size, height and spacing of studs shall be per Table 2308.9.1 except that Utility studs cannot be spaced at more than 16 inches. Corners shall be three studs unless some other approved method is employed to provide adequate backing for finish materials. Non bearing walls may be framed with 2x3's and may use flat framed studs.

Top Plates: Bearing and exterior wall studs shall be capped by double top plates installed to provide overlapping at corners and at intersections with other partitions. End joints shall be overlapped at least 48 inches and nailed with not less than eight 16d nails each side of the joint. Plates shall be at least nominal 2 inch lumber and at least as wide as the stud. Single top plates are allowed provided they are adequately tied at the joints and corners by minimum 3" x 6" x 0.036" thick plates with at least six 8d nails each side.

Bottom Plates: Shall be at least nominal 2 inch lumber and at least as wide as the studs.

Cripple Wall Bracing: Cripple walls having a stud height exceeding 14 inches shall be considered a story and shall be braced as required for braced wall lines. Where interior braced wall lines occur without a continuous foundation below, the length of parallel exterior cripple wall bracing shall be one and one half times the lengths required otherwise. When this requirement cannot be provided then the nail spacing shall be reduced to 4 inches.

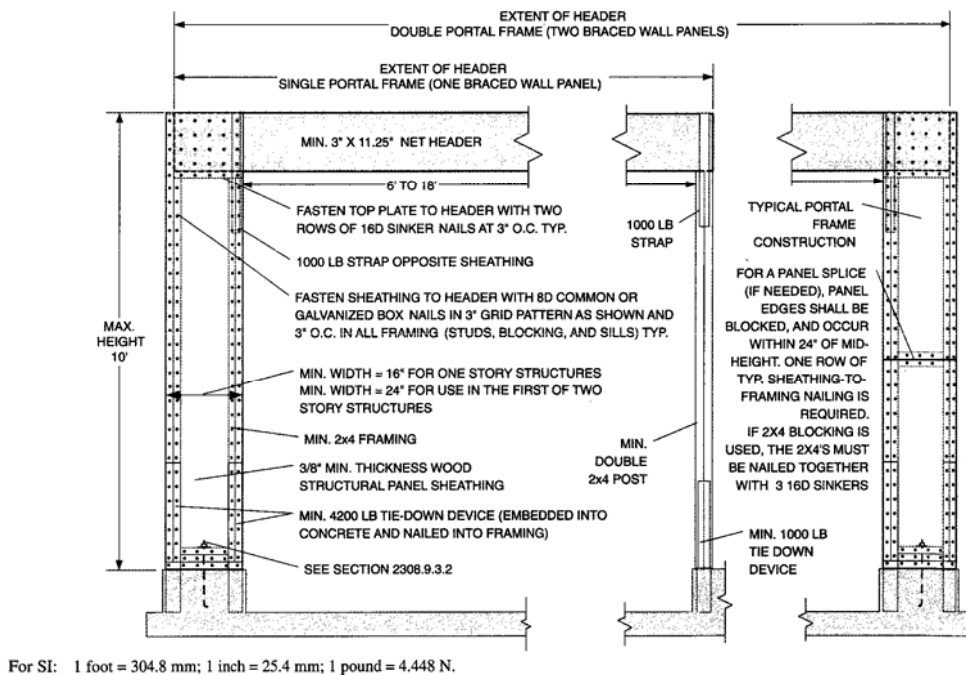


FIGURE 2308.9.3.2
ALTERNATE BRACED WALL PANEL ADJACENT TO A DOOR OR WINDOW OPENING

**TABLE 2308.9.3(1)
BRACED WALL PANELS^a**

SEISMIC DESIGN CATEGORY	CONDITION	CONSTRUCTION METHODS ^{b,c}								BRACED PANEL LOCATION AND LENGTH ^d
		1	2	3	4	5	6	7	8	
A and B	One story, top of two or three story	X	X	X	X	X	X	X	X	Located in accordance with Section 2308.9.3 and not more than 25 feet on center.
	First story of two story or second story of three story	X	X	X	X	X	X	X	X	
	First story of three story	—	X	X	X	X ^e	X	X	X	
C	One story or top of two story [HCD 1] or three story	—	X	X	X	X	X	X	X	Located in accordance with Section 2308.9.3 and not more than 25 feet on center.
	First story of two story [HCD 1] or second story of three story	—	X	X	X	X ^e	X	X	X	Located in accordance with Section 2308.9.3 and not more than 25 feet on center, but total length shall not be less than 25% of building length ^f .
	[HCD 1] First story of three story	—	X	X	X	X ^e	X	X	X	[HCD 1] Located in accordance with Section 2308.9.3 and not more than 25 feet on center, but total length shall not be less than 40% of building length.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. This table specifies minimum requirements for braced panels that form interior or exterior braced wall lines.

b. See Section 2308.9.3 for full description.

c. See Sections 2308.9.3.1 and 2308.9.3.2 for alternative braced panel requirements.

d. Building length is the dimension parallel to the braced wall length.

e. Gypsum wallboard applied to framing supports that are spaced at 16 inches on center.

f. The required lengths shall be doubled for gypsum board applied to only one face of a braced wall panel.

**TABLE 2308.9.3(2)
EXPOSED PLYWOOD PANEL SIDING**

MINIMUM THICKNESS ^a (inch)	MINIMUM NUMBER OF PLIES	STUD SPACING (inches) Plywood siding applied directly to studs or over sheathing
$\frac{3}{8}$	3	16 ^b
$\frac{1}{2}$	4	24

For SI: 1 inch = 25.4 mm.

a. Thickness of grooved panels is measured at bottom of grooves.

b. Spans are permitted to be 24 inches if plywood siding applied with face grain perpendicular to studs or over one of the following: (1) 1-inch board sheathing, (2) $\frac{7}{16}$ -inch wood structural panel sheathing or (3) $\frac{3}{8}$ -inch wood structural panel sheathing with strength axis (which is the long direction of the panel unless otherwise marked) of sheathing perpendicular to studs.

**TABLE 2308.9.3(3)
WOOD STRUCTURAL PANEL WALL SHEATHING^b
(Not Exposed to the Weather, Strength Axis Parallel or Perpendicular to Studs Except as Indicated Below)**

MINIMUM THICKNESS (inch)	PANEL SPAN RATING	STUD SPACING (inches)		
		Siding nailed to studs	Nailable sheathing	
			Sheathing parallel to studs	Sheathing perpendicular to studs
$\frac{5}{16}$	12/0, 16/0, 20/0 Wall-16" o.c.	16	—	16
$\frac{3}{8}$, $\frac{15}{32}$, $\frac{1}{2}$	16/0, 20/0, 24/0, 32/16 Wall-24" o.c.	24	16	24
$\frac{7}{16}$, $\frac{15}{32}$, $\frac{1}{2}$	24/0, 24/16, 32/16 Wall-24" o.c.	24	24 ^a	24

For SI: 1 inch = 25.4 mm.

a. Plywood shall consist of four or more plies.

b. Blocking of horizontal joints shall not be required except as specified in Sections 2306.4 and 2308.12.4.

TABLE 2308.9.3(4)
ALLOWABLE SPANS FOR PARTICLEBOARD WALL SHEATHING
 (Not Exposed to the Weather, Long Dimension of the Panel Parallel or Perpendicular to Studs)

GRADE	THICKNESS (Inch)	STUD SPACING (Inches)	
		Siding nailed to studs	Sheathing under coverings specified in Section 2308.9.3 parallel or perpendicular to studs
M-S "Exterior Glue" and M-2 "Exterior Glue"	$\frac{3}{8}$	16	—
	$\frac{1}{2}$	16	16

For SI: 1 inch = 25.4 mm.

TABLE 2308.9.3(5)
HARDBOARD SIDING

HANDBOOK SIDING					
SIDING	MINIMUM NOMINAL THICKNESS (inch)	2 x 4 FRAMING MAXIMUM SPACING	NAIL SIZE ^{a,b,d}	NAIL SPACING	
				General	Bracing panels ^c
1. Lap siding					
Direct to studs	³ / ₈	16" o.c.	8d	16" o.c.	Not applicable
Over sheathing	³ / ₈	16" o.c.	10d	16" o.c.	Not applicable
2. Square edge panel siding					
Direct to studs	³ / ₈	24" o.c.	6d	6" o.c. edges; 12" o.c. at intermediate supports	4" o.c. edges; 8" o.c. at intermediate supports
Over sheathing	³ / ₈	24" o.c.	8d	6" o.c. edges; 12" o.c. at intermediate supports	4" o.c. edges; 8" o.c. at intermediate supports
3. Shiplap edge panel siding					
Direct to studs	³ / ₈	16" o.c.	6d	6" o.c. edges; 12" o.c. at intermediate supports	4" o.c. edges; 8" o.c. at intermediate supports
Over sheathing	³ / ₈	16" o.c.	8d	6" o.c. edges; 12" o.c. At intermediate supports	4" o.c. edges; 8" o.c. at intermediate supports

For SI: 1 inch = 25.4 mm.

a. Nails shall be corrosion resistant.

b. Minimum acceptable nail dimensions:

	Panel Siding (Inch)	Lap Siding (Inch)
Shank diameter	0.092	0.099
Head diameter	0.225	0.240

c. Where used to comply with Section 2308.9.3.

d. Nail length must accommodate the sheathing and penetrate framing $1\frac{1}{2}$ inches.

TABLE 2304.9.1—continued
FASTENING SCHEDULE

CONNECTION	FASTENING ^{a,m}	LOCATION
30. Ledger strip	3 - 16d common (3 1/2" × 0.162") 4 - 3" × 0.131" nails 4 - 3" 14 gage staples	face nail
31. Wood structural panels and particleboard ^b Subfloor, roof and wall sheathing (to framing)	1/2" and less 6d ^{c,1} 2 3/8" × 0.113" nail ⁿ 1 3/4" 16 gage ^o 19/32" to 3/4" 8d ^d or 6d ^e 2 3/8" × 0.113" nail ^p 2" 16 gage ^p 7/8" to 1" 8d ^e 1 1/8" to 1 1/4" 10d ^d or 8d ^d 3/4" and less 6d ^e 7/8" to 1" 8d ^e 1 1/8" to 1 1/4" 10d ^d or 8d ^e	
Single Floor (combination subfloor-underlayment to framing)		
32. Panel siding (to framing)	1/2" or less 6d ^f 5/8" 8d ^f	
33. Fiberboard sheathing ^s	1/2" No. 11 gage roofing nail ^h 6d common nail (2" × 0.113") No. 16 gage staple ⁱ 25/32" No. 11 gage roofing nail ^h 8d common nail (2 1/2" × 0.131") No. 16 gage staple ⁱ	
34. Interior paneling	1/4" 4d ^j 3/8" 6d ^k	

For SI: 1 inch = 25.4 mm.

- Common or box nails are permitted to be used except where otherwise stated.
- Nails spaced at 6 inches on center at edges, 12 inches at intermediate supports except 6 inches at supports where spans are 48 inches or more. For nailing of wood structural panel and particleboard diaphragms and shear walls, refer to Section 2305. Nails for wall sheathing are permitted to be common, box or casing.
- Common or deformed shank (6d - 2" × 0.113"; 8d - 2 1/2" × 0.131"; 10d - 3" × 0.148").
- Common (6d - 2" × 0.113"; 8d - 2 1/2" × 0.131"; 10d - 3" × 0.148").
- Deformed shank (6d - 2" × 0.113"; 8d - 2 1/2" × 0.131"; 10d - 3" × 0.148").
- Corrosion-resistant siding (6d - 1 7/8" × 0.106"; 8d - 2 3/8" × 0.128") or casing (6d - 2" × 0.099"; 8d - 2 1/2" × 0.113") nail.
- Fasteners spaced 3 inches on center at exterior edges and 6 inches on center at intermediate supports, when used as structural sheathing. Spacing shall be 6 inches on center on the edges and 12 inches on center at intermediate supports for nonstructural applications.
- Corrosion-resistant roofing nails with 7/16-inch-diameter head and 1 1/2-inch length for 1/2-inch sheathing and 1 3/4-inch length for 25/32-inch sheathing.
- Corrosion-resistant staples with nominal 7/16-inch crown and 1 1/8-inch length for 1/2-inch sheathing and 1 1/2-inch length for 25/32-inch sheathing. Panel supports at 16 inches (20 inches if strength axis in the long direction of the panel, unless otherwise marked).
- Casing (1 1/2" × 0.080") or finish (1 1/2" × 0.072") nails spaced 6 inches on panel edges, 12 inches at intermediate supports.
- Panel supports at 24 inches. Casing or finish nails spaced 6 inches on panel edges, 12 inches at intermediate supports.
- For roof sheathing applications, 8d nails (2 1/2" × 0.113") are the minimum required for wood structural panels.
- Staples shall have a minimum crown width of 7/16 inch.
- For roof sheathing applications, fasteners spaced 4 inches on center at edges, 8 inches at intermediate supports.
- Fasteners spaced 4 inches on center at edges, 8 inches at intermediate supports for subfloor and wall sheathing and 3 inches on center at edges, 6 inches at intermediate supports for roof sheathing.
- Fasteners spaced 4 inches on center at edges, 8 inches at intermediate supports.

TABLE 2308.12.4
WALL BRACING IN SEISMIC DESIGN CATEGORIES D AND E
(Minimum Length of Wall Bracing per each 25 Linear Feet of Braced Wall Line^a)

CONDITION	SHEATHING TYPE ^b	$S_{DS} < 0.50$	$0.50 \leq S_{DS} < 0.75$	$0.75 \leq S_{DS} \leq 1.00$	$S_{DS} > 1.00$
One story	G-P ^c	10 feet 8 inches	14 feet 8 inches	18 feet 8 inches	25 feet 0 inches
	S-W	5 feet 4 inches	8 feet 0 inches	9 feet 4 inches	12 feet 0 inches
Story below top story [HCD 1]	G-P ^{c,d}	18 feet 8 inches ^d	NP	NP	NP
	S-W ^d	10 feet 8 inches ^d	13 feet 4 inches ^d	17 feet 4 inches ^d	21 feet 4 inches ^d
Bottom story of three stories [HCD 1]	G-P	Conventional construction not permitted; conformance with Section 2301.2, Item 1 or 2 is required.			
	S-W				

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- a. Minimum length of panel bracing of one face of the wall for S-W sheathing or both faces of the wall for G-P sheathing; h/w ratio shall not exceed 2:1. For S-W panel bracing of the same material on two faces of the wall, the minimum length is permitted to be one-half the tabulated value but the h/w ratio shall not exceed 2:1 and design for uplift is required.
- b. G-P = gypsum board, fiberboard, particleboard, lath and plaster or gypsum sheathing boards; S-W = wood structural panels and diagonal wood sheathing. NP = not permitted.
- c. Nailing as specified below shall occur at all panel edges at studs, at top and bottom plates and, where occurring, at blocking:
 For 1/2-inch gypsum board, 5d (0.113 inch diameter) cooler nails at 7 inches on center;
 For 5/8-inch gypsum board, No. 11 gage (0.120 inch diameter) at 7 inches on center;
 For gypsum sheathing board, 1 3/4 inches long by 7/16-inch head, diamond point galvanized nails at 4 inches on center;
 For gypsum lath, No. 13 gage (0.092 inch) by 1 1/8 inches long, 19/64-inch head, plasterboard at 5 inches on center;
 For Portland cement plaster, No. 11 gage (0.120 inch) by 1 1/2 inches long, 7/16-inch head at 6 inches on center;
 For fiberboard and particleboard, No. 11 gage (0.120 inch) by 1 1/2 inches long, 7/16-inch head, galvanized nails at 3 inches on center.
- d. [HCD 1] Applies to detached one- and two-family dwellings only.

Additional information can be obtained by visiting our website at www.sanjoseca.gov/building/ or by calling the Building Division voice mail at (408) 535-3555. In addition you may visit the Building Division in City Hall at 200 e. Santa Clara St. Our hours are 9:00 a.m. to 4:00 p.m. with limited service between 12:00 p.m. and 1:00 p.m.